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Title: **Zero Time™: A Conceptual Architecture for 21st Century Enterprises**

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Abstract:

Discusses Zero Time, or manipulating time as an independent variable, as critical to any enterprise's success in the 21st Century. Discusses five disciplines of a Zero Time organization (customer value driven, knowledgization, holonic management, zero resistance and inclusion) and how the disciplines result in instant customerization, meaning the needs of the customer are met as soon as the needs are expressed. Provides examples of near-Zero Time organizations. Applies a methodology, consisting of strategic visioning and operational excellence, for any organization to follow to evolve holistically into a Zero Time organization, allowing it to quickly and effectively adapt to rapid, continuous change.

Keywords: management; Zero Time; strategic visioning; operational excellence; organizational models; customer service; virtual processes

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Zero Time™: A Conceptual Architecture for 21st Century Enterprises

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Introduction

> *"I was to learn later in life that we tend to meet any new situation by reorganizing and a wonderful method it can be for creating the illusion of progress, while producing confusion, inefficiency and demoralization."*
>
> Petronius Arbiter
> Roman Imperial Army, 60 AD

How often have we repeated the same pattern in order to deal with new situation by reorganizing? In the digital economy, change is the norm and speed is the name of the game. Time and space will continue to shrink rapidly using new technologies in computing and communication. But new generations of customers are never satisfied–they look for instant gratification. We need a new kind of organization to successfully navigate through the 21st century world of speed and constant change.

How can businesses build organizations capable of reacting and responding with the efficiency of science-fictional entities such as Star Trek? Captain Kirk, and other leaders in later stories, commanded a starship equipped for any possible situation, even one "unknowable" in advance. The crew was a complete entity within itself, able to make and implement decisions without assistance from the headquarters residing at StarFleet. The combination of advanced technologies, thoughtful leadership, and an empowered crew almost always led to the successfully resolution of any complication to ensure a successful mission. Of course, technological innovations such as a machine that "beamed" individuals to remote locations at warp speed and devices that linked crew members to others whenever and wherever necessary enabled the crew to break through most barriers and seemingly counter any resistance. Fans of the show need only hear "make it so," "beam me up," or "to boldly go" to conjure up images of an organization that actually harbors many of the most characteristics most desirable in business today. These characteristics are mainstays of what we term the "**Zero Time** organization."

Although StarTrek is a science fiction fantasy, there are several real-life examples. When CitiBank first offered its "Power Loan," the industry's average time for mortgage approval was between 30 and 45 days. In the program's first year, power loan guaranteed 15-day approval; in the second year, it reduced approval time to 15 minutes. When customers of Progressive Insurance are involved in an accident, frequently the Progressive agent is there, even before the police, because of an intelligence device installed in the customer's car. In addition to taking care of Progressive's customers, agents have the authority to make an "instant settlement" by immediately writing a check to the customer. Intel's ex-CEO Andy Grove projected that microprocessor power would double machine performance at every price point every year. Massachusetts General Hospital offers instant telemedicine to customers in Saudi Arabia. Continental airline was the first to offer E-ticket, self-service, electronic ticketing at the airports, and Toyota was the first to introduce just-in-time inventory. These elite companies have been treating **time** as a valuable resource, trying to manage it to gain competitive advantages by using what we call *instant customerization*. In fact, Stalk and Hout suggest that time-based companies have gained distinct advantages over their competitors as suggested by the following table from their book *Competing Against Time* (See Figure 1).

Figure 1: Advantages Gained by Time-Based Companies

Company	Business	Response Difference	Growth Advantage vs. Average Competitor	Profit Advantage vs. Average Competitor
Wal Mart	Discount Store	80%	3x	2x
Atlas Door	Industrial Doors	66%	3x	5x
Ralph Wilson Plastics	Decorative Laminates	75%	3x	4x
Thomasville	Decorative Laminates	70%	4x	2x

Adapted from *Competing Against Time*, by Stalk and Hout

The companies in this table were able to respond to customers at least 66% faster, grow three to four times faster, and have at least double the profit advantage of their average competitors. These companies demonstrate characteristics of the Zero Time organization that we see as critical for the digital economy of the 21st century:

- Zero resistance – The information needed was available when it was needed.
- Total empowerment – The service representative was able to reach the expert regardless of convenience or proximity.
- Knowledge management – The service representative not only responded to the customer's question, but learned what the answer was, thereby increasing his or her knowledge for future questions.

In this paper, we discuss the concept of Zero Time from several perspectives. First, we describe the Zero Time thinking and the disciplines of a Zero Time organization. Then we provide examples of near-Zero Time companies we find in existence today. We then describe how to become a Zero Time organization, and conclude with a section on actually being a Zero Time organization.

Zero Time Philosophy

"To see clearly is poetry, prophecy, and religion—all in one."
John Ruskin, Modern Painters, 1888

We believe that manipulating time as an independent variable will be critical to any enterprise's success in the 21st century. But what is time and how it is valued? To comprehend the importance of time, consider the following situations (Source: Anonymous, Internet, 1998):

To realize the value of *one year*, ask a student who has failed his exam;
To realize the value of *one month*, ask a mother who has given birth to a premature baby;
To realize the value of *one week*, ask an editor of a weekly newspaper;
To realize the value of *one day*, ask a daily wage laborer who has ten kids to feed;
To realize the value of *one hour*, ask the lovers who are waiting to meet;
To realize the value of *one minute*, ask a person who has missed the train;
To realize the value of *one second*, ask a person who has survived an accident;
To realize the value of *one millisecond*, ask the person who has won a silver medal in Olympics.

Many enterprises today understand the importance of time from a multitude of viewpoints. FedEx understood that customers would pay premiums for getting the right information at the right time; Dell understood that a "build to order" manufacturing process would guarantee its product delivery in five days from order. Progressive Insurance understood the value of an instant settlement. And Intel and 3M, among others, understood the value of "time pacing" (Eisenhardt and Brown, 1998) to rapidly turn over their product lines. The stellar performances of these leaders demonstrate how time can be an effective competitive weapon.

While the goal of shrinking time to zero is common, Zero Time thinking is unique. It is similar to the difference between quality management and zero defects. The former assumes that there are defects, and hence there is a need to manage defects so that the end product will contain only an acceptable level of those defects. The latter, on the other hand, assumes that there will be *no* defects. While the goal of both approaches is to realize no defects, their methods will be totally different. In fact, for many organizations, incremental improvements may never lead the organization to the so-called "promised land."

Normally we think of time as sequential, or "horizontal," in that time flows linearly. Given this, we try to 'slice' our time in order to gain efficiency when dealing with the multitude of situations we encounter daily. As we tackle problems in different time slices, we bring a part of our knowledge, energy and emotion to determine solutions. Zero Time thinking is like taking a view from a "vertical" perspective (Davis, 1996) in that *all* of our knowledge, energy and emotions are brought to bear on the problem. As such, each problem can be solved instantly because we are able to *see* differently. This may sound strange, but a consideration of the experiences of people in a state of meditation or hypnosis suggests that in such a deep state, one can instantly grasp any problem because the notion of time does not exist; time stands still, and the mind is clear. Many world-class scientists are able to see through the complexity of a problem to reach the essential result. *"I think, therefore, I am"* is the philosophy of Zero Time. While this may sound like a fantasy, it exerts a new way of looking at how an organization or individual must function. The following table provides a summary of how we view Zero Time thinking, in contrast to conventional wisdom (See Figure 2).

Figure 2: Conventional Wisdom versus Zero Time Thinking

Conventional Wisdom	Zero Time Thinking
Remedial Medicine	Preventative Medicine
Quality Management	Zero Defects
Mechanistic	Holistic
Either/Or	Simultaneity
Do	Being
Control	Letting Go

Zero Time organizations are those that can *see* differently, and have the capability to *act instantly* on what they *see.*

Disciplines of a Zero Time Organization

> *"All men can see these tactics whereby I conquer, but what none can see is the strategy out of which victory is evolved."*
>
> Sun Tzu, *The Art of War*

A Zero Time organization can be characterized by five disciplines: *customer value driven; knowledgization, holonic management, zero resistance, and inclusion.* These disciplines are briefly introduced, then further refined in examples and a description of how to become a Zero Time organization.

Customer Value Driven

A customer value-driven organization relentlessly pursues an understanding of its customers' values–both explicit and implicit–with time control as the ultimate goal. The obvious values are of course different for different customers. For example, SWATCH's customers desire fashion; Harley Davidson's want lifestyle; Sony's look for innovation; Compaq's demand quality; Wal-Mart's go for low price; 3M's value innovation; and IBM's seek premium service. But beyond these values, customers want more. They want to have whatever it is they seek, and to obtain it at a price point that renders the deal satisfactory. It is the desire to *exceed* the expectations of their customers that leads these elite organizations to excel. Practices of time-driven thinking improve quality and customer satisfaction. Compaq's CEO, Eckhard Pfeiffer launched a new business model, the Optimized Distribution Model (ODM), which exemplifies this perspective. "ODM sees our entire business from the customer's point of view. Compaq believes that ODM will create a new customer-value revolution," according to Pfeiffer (Teresko, 1998).

One way these elite companies deliver more is to incorporate the value of time into their processes and services. For example, Wal-Mart and Proctor and Gamble linked their databases in a way that pioneered virtual integration to drastically reduce costs and shorten the cycle time for shelf replenishment. Compaq uses Just-In-Time inventory management and build-to-order manufacturing to improve its cycle time to market, and ultimately to reduce costs while maintaining quality. SONY utilizes the concept of "product families" (Ram, 1998) to reduce cycle time.

Knowledgization

Knowledgization is the capacity to continuously learn and create knowledge, then convert it into customer value. We consider knowledge to be any information collected by the organization and then assimilated and processed in some manner in order to make it useful to those who need it. Pure information, on the other hand, is a static arrangement of data, without any assimilation or processing to make it more easily used. There are several components necessary to build knowledgization into an organization: an environment for learning, molecularization of the knowledge into chunks that are useful to people, and an infrastructure supporting seamless integration of computing, communication, and content technologies. For example, 3M's 15-percent rule provides an environment in which an employee can request that 15 percent of his or her time be allocated to pursue potential interests to the corporation in order to continue to create knowledge and convert it into customer value. The ubiquitous "post-it" sticker is a product of the

15-percent rule. Another example is the widely used concept of distance learning, where on-demand training is used to distribute knowledge efficiently and effectively.

Through knowledgization, it becomes possible to embed intelligence into products and services GM's *OnBoard* system facilitates the integration of computing, communications and content to each individual car (Pearlson, 1998). Some of Otis Elevator's products include embedded processors and communications systems to allow self-diagnosing and to remotely alert the service and maintenance organization of impending failures (Ostrofsky and Cash, 1991). Similarly, utility and telephone companies are beginning to offer automatic diagnosis and repair services.. Knowledgization is the core competency for a Zero Time organization because it is the basis for ensuring the other disciplines can be achieved.

Holonic Management

Holonic Management[1] is the concept that every part of the organization is in and of itself a whole, complete entity, or a whole within a whole. The concept of *holon*–a whole within a whole–is in fact visible in such naturally occurring entities as the genetic code. Holonic management means that every person in the Zero Time organization has the ability and the permission to do whatever needs to be done *in order to produce value for customers.* Every person is totally empowered with both the knowledge and the capability to complete whatever tasks he or she is asked to perform. Likewise, teams of workers themselves are also complete and have the tools, ability and capability to complete whatever work they are asked to do. A holonic management model implies that each whole is aligned with the corporate whole, and all parts are empowered to do what needs to be done. NEC, the computer giant of Japan, highlights the way a holonic organization works. NEC's mobile division's manufacturing line near Tokyo was reduced from 105 meters to 8.5 meters by incorporating the concept of holonics. Each line worker is part of a "spider," or cell, and each worker has a storage box containing one day's supply of parts. The workers in the spider have everything they need to do the job they need to do. If they need assistance, they know to whom to go, and are empowered to seek out whatever is necessary to complete their day's work.

NEC has obtained outstanding results by incorporating a holonic design into the manufacturing process. Manufacturing at NEC is based on the orders received –a pull strategy, rather than on the level of inventory–a push strategy. And the workers report increased satisfaction with the manufacturing process, thus reducing costs associated with high employee turnover and low satisfaction.

The concept of whole within a whole is not new. Wal-Mart used the concept "a store within a store" to give department managers the authority and freedom to run each department as if it were their own business. Fast food franchises such as McDonalds also exhibit holonic thinking. Another example is the concept of a "micro-enterprises unit" of Xerox. This unit is one person who represents Xerox with the ability at his or her disposal to satisfy customers' needs, no matter what they might be.

[1] This phrase was invented by Dr. Yukio Mizuno of NEC.

Zero Resistance

A zero-resistant process is one in which there are no obstacles to performing whatever tasks are required. Total and immediate availability of all resources needed to complete a task is crucial to zero resistance. Like a superconductor through which current can flow without producing heat, in a Zero Time organization, the process can occur without interruption, wait time, or downtime. Zero resistance requires that individuals have achieved personal mastery of tasks and that they are empowered to follow them through. Many organizations today use virtualization, that is, trading virtual space with physical space, to achieve near-zero resistance. For example, Massachusetts General Hospital is practicing telemedicine in Saudi Arabia so that patients across the ocean can get access to top medical experts immediately through the hospital's telemedicine program. The virtual bookstore, amazon.com, is another such example, since a customer seeking a book can locate, order, pay, and receive it without encountering any impediments or complications. Manufacturers such as Dell and Compaq have replaced inventory with information which reduce resistance. Meditronic has increased its adaptability to market changes through a multigenerational strategy for new product development. As a consequence of this approach, called "rhythm-management," Meditronic's worldwide share of the pacing business has increased from 30% in 1985 to 50% in 1997, and over 70% of their revenues come from products introduced in the past 12 months (Stevens, 1998). Zero resistance is a critical characteristic of a Zero Time organization.

Inclusion

Inclusion means that all people who need to be involved are involved–automatically–with neither physical nor technological boundaries to limit accessibility. The Zero Time organization is a proactive organization that anticipates, senses and responds to the environmental changes influencing completion of the corporation's mission and goals. For example, Toyota, Ford, and Intel for years have been including both customers and suppliers in the design of their next-generation products.

This concept is best illustrated through value-added partnerships (VAP) where each partner has a stake in the other partner's successes and failures. The VAP builds on the potential economies of scale and scope of each partner to reduce costs, increase expertise, and leverage knowledge. Figure 3 illustrates the VAP of farm products

Figure 3: Supply-Chain for Agricultural Goods

Information technology provides the basic infrastructure for inclusion. One pioneer of the VAP concept is McKesson Corporation, the pharmaceutical products distributor. In the 1970's, McKesson considered selling its pharmaceutical wholesale and distribution business because of the fierce competition from chains. Instead, McKesson created VAPs with insurance companies,

drug stores, and consumers using information technology. Another classic example of inclusion is the Boeing 777 design team. The airlines planning to purchase the new airplane, United, Cathay Pacific, Japan Airlines, and All Nippon Airlines, were involved in the design, production and introduction of the product. The paperless system extended beyond Boeing's boundaries to include their customers who influenced final design criteria such as width of the fuselage, reliability and maintenance, size of operating buttons and configuration of compartments (Tapscott, 1996).

Figure 4: Disciplines of Zero Time Organizations

Discipline	Description
Customer-Value Driven	Core value of company is based on customers' values.
Knowledgization	Capacity to continuously learn and create knowledge, then convert it into customer value.
Holonic Management	Every part of the organization is in itself a whole, complete entity with the ability and authority to function independently.
Zero Resistance	The property in which there are no obstacles to completing any required tasks, processes, or activities.
Inclusion	All individuals and groups who need to be involved are automatically involved when the process takes place.

These five disciplines (see Figure 4) result in *instant customerization*, which means that the needs of any customer are fulfilled as soon as the needs are expressed. Instantaneous fulfillment of customer needs is achieved by converting knowledge into something valued by the customer. Among the models for how to do this is the emergency room, an organization that provides virtually unlimited resources (access to experts, databases, processing time, products, etc.) to the individual servicing the patient. Like an emergency room, where the doctors, nurses, and equipment needed to treat emergency patients are all present or near by and easily accessible, this model suggests that organizations can achieve instant customerization by keeping all resources close to the customer service representative or other employee who needs to complete tasks. Example companies who use this model are Amazon.com, where their large virtual inventory makes it possible to order just about any book in print and have it delivered directly to the customer and luxury hotels, where they pamper customers by providing anything needed, such as business centers, health clubs, a variety of restaurants, etc. to make their stay satisfactory. In the other model, the Disneyland model, an organization provides the customers with a set of choices and allows the customer to effectively provide self-service. By providing the environment and a choice of rides and attractions, Disneyland enables every guest to experience a unique vacation within the boundaries of the park[2]. Elite manufacturers such as Dell, Compaq and GM and fast food chains like McDonalds are in this category, where customers have a wide range of choices of products to buy, but these choices are bounded by what the company offers. A third model, which we call the Hybrid model, is a mix of the Emergency Room and Disneyland Models. Mega-retailers such as Wal-Mart and Home Depot fall into this category since they have very large inventories which make for extremely many selections, like the Disneyland model, but they offer customers services which help customers customize their selections to make almost endless

2 These models are similar to those described by Regis McKenna in his book *Real Time*. The difference is that Zero Time organizations, while customer focused, are not entirely marketing driven. Real-time organizations exhibit similar characteristics, but are primarily concerned with responding to needs of external customers. Zero Time organizations focus on the employee mindset and the organization culture as a means of satisfying external customers.

possibilities, like the Emergency Room model. Barnes and Noble, the book store chain, is also a hybrid in that it provides a rich selection of books coupled with an ability to custom order any book in print. These 3 models are summarized in Figure 5.

Figure 5: Models of Instant Customerization

Model	Description
Emergency Room Model	Everything necessary to satisfy the customers' needs and choices is waiting, accessible whenever needed.
Disneyland Model	A bounded set of choices is available, from which each customer selects whatever he or she wants.
Hybrid Model	Reasonable set of choices is available coupled with a way to customize these choices to meet whatever need customer has.

Examples of Near-Zero Time Organizations

"I have always concentrated all along on building the finest retailing company that we possibly could. Period."

Sam Walton

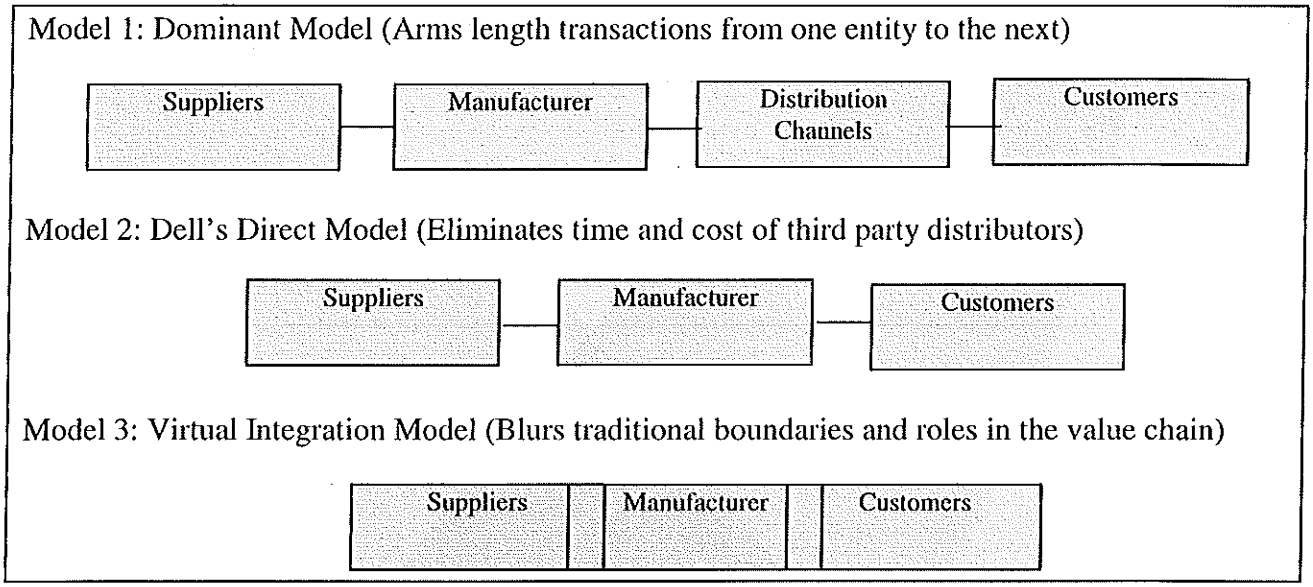
While no one organization exhibits a full complement of the disciplines listed above for a Zero Time organization, there are many companies that have components we consider to be excellent examples of the Zero Time concept. In addition to Disneyland and the emergency-room model, many other organizations have built Zero Time components into their current strategy. The concept of Zero Time should emerge through the following description of two global companies: Dell Computers and FedEx.

Dell Computers is best known for its pioneering use of the direct marketing channel for selling and distributing personal computer systems. Its now-famous strategy of manufacturing a system for a customer, or build to order, has provided Dell with a cascading series of advantages over its competition–including low inventory costs, no dealer costs, and current technology in every system manufactured. Conventional wisdom said that it was necessary to have inventories of systems in order to provide customers with many choices, and it was necessary to have those systems sold through dealers who could explain the complexities of the systems and give customers a chance to "kick the tires." Instead, Dell gave the customer a chance to pick whatever features he or she wanted from those available. In addition, Dell manufactured systems only after they were ordered by a customer, which conventional wisdom would say was either too costly or took too long. But Dell was able to guarantee delivery within five days of order. Finally, Dell saw that personal computers were becoming a commodity and realized that sales people would not be needed to explain the systems in the conventional, physical way.

The result is a win/win situation for both Dell and its customers. Factory inventory is at most three days, supported by tight alliances with suppliers who deliver smaller loads, but more frequently than traditional manufacturing systems. Downstream inventory is zero since the systems are directly shipped to customers. No one in the "stream" is siting with inventory, whereas traditional supply chains hold up to 60 days of inventory of parts and 30 days of inventory of systems for dealers. Figure 6 summarizes the evolution of business models of Dell, from direct model to

virtual integration as it continues to enlarge the distance between Dell and its competitor a more traditional value chain model.

Figure 6: Three Models of Personal Computer Industry Value Chains (adapted from Magreta, 1998)



There are several examples of Zero Time characteristics in the Dell example. First, we discuss the values that drive Dell's culture. The Dell Direct Model, shown in Figure 7, highlights how the build-to-order philosophy is central to the Dell culture.

Figure 7: The Dell Direct Model (Source: Dell Corporate Web Site, May 1998)

Dell's award-winning customer service, industry-leading growth and financial performance continue to differentiate the company from competitors. At the heart of that performance is Dell's unique direct-to-customer business model. "Direct" refers to the company's relationships with its customers, from home-PC users to the world's largest corporations. There are no retailers or other resellers adding unnecessary time and cost, or diminishing Dell's understanding of customer expectations. Why are computer-systems customers and investors increasingly turning to Dell and its unique direct model? There are several reasons:

•Price for Performance. By eliminating resellers, retailers and other costly intermediary steps together with the industry's most efficient procurement, manufacturing and distribution process Dell offers its customers more powerful, more richly configured systems for the money than competitors.

•Customization. Every Dell system is built to order. Customers get exactly, and only, what they want.

•Service and Support. Dell uses knowledge gained from direct contact before and after the sale to provide award-winning, tailored customer service.

•Latest Technology. Dell's efficient model means the latest relevant technology is introduced in its product lines much more quickly than through slow-moving indirect distribution channels. Inventory is turned over every 10 or fewer days, on average, keeping related costs low.

•Superior Shareholder Value. During the last fiscal year, the value of Dell common stock more than doubled. In 1996 and 1997, Dell was the top-performing stock among the Standard & Poor's 500 and Nasdaq 100, and represented the top-performing U.S. stock on the Dow Jones World Stock Index.

Dell incorporates knowledgization into its process after the customer gives the order. This order triggers the manufacturing process. There is Zero Time between when the customer's order is received and the manufacturing process begins. This process involves ordering the parts to include in the system, and preparing the software to be downloaded into the system. When Dell accepts the order, the information system sets all necessary components in motion. The information, entered by a customer or Dell's salesperson, contains all the information manufacturing needs to begin building the product. This is an example of Zero Time knowledgization since all the information needed by manufacturing is ready and available to manufacturing when it needs it. There is instant transmission of the information from the customer's order to the systems that will need to complete that order.

Dell also illustrates the concept of Zero Time inclusion. Relationships with suppliers are critical to make the "build-to-order" concept work. Suppliers are able to know what parts are needed when the order is taken–messages are sent to them if supplies are needed that were previously unanticipated. Short cycle times are possible because the suppliers are included in the process. Similarly, the delivery vendors are part of the process. FedEx provides logistics services that go beyond simply picking up the package and delivering it to the customer. FedEx actually stocks components such as monitors. When a system is ordered, FedEx is sent a message to begin the process of shipping the required components to customers, resulting in delivery of all needed system components at the same time. Finally, even the customer is part of the process. New web technology has enabled Dell to offer its customers access to the systems that help them configure their desired purchase. Customer orders over the web have added significantly to sales, further pushing the direct marketing model.

Zero resistance is clearly illustrated through the build-to-order strategy. There is no downtime, or wait time, in the process. It is possible to fill orders as soon as they are received. Suppliers get the order when Dell gets the order; there is no resistance to transmitting the orders. Since manufacturing has all the parts needed to build the order, there is no resistance to making it happen.

Where does Dell go from here? To further its path towards a Zero Time organization, it would continue to reduce time in its process. The future could bring a complete computer on a chip, where the hardware is all manufactured the same way, and the software is the differentiating factor. For example, a customer would be shipped a system within one day (or hour) of ordering, and when it was received, it would be turned on and immediately connected to a network which would download all the software the customer desires. The system would then automatically configure itself for the customer, based on the software loaded. Customers would receive systems in a very short time, but at the same time Dell would not incur the costs of inventory typically necessary to respond this quickly.

A second company that illustrates concepts of Zero Time is FedEx, the package delivery company. FedEx has created a successful business by helping companies reduce time in their processes by shipping packages overnight. To do this, its internal operations revolve around Zero Time . For example, when a customer wants to ship a package, he or she enters information into the FedEx computer either through a terminal located in the customer's shipping room or over the Internet. An airbill is automatically printed out and a FedEx service person is dispatched to pick

up the package. Once the package is picked up, the information systems track where the package is until it is delivered to the recipient. The value-driven culture is well documented in the company's sales tag line, "(Customers use FedEx) If it absolutely, positively has to get there on time." Implied in this vision is that the company will do whatever is necessary to satisfy the customer. There is no question that time is the most valuable resource FedEx seeks to manage. The results are consistent innovations that further allow FedEx to provide increasingly outstanding services.

FedEx illustrates knowledgization through its extensive information infrastructure. Web access allows any individual to instantly locate information about his or her packages while they are under the auspices of the FedEx transportation system. As a package moves through the FedEx logistics system, its location is automatically updated in the database, which is accessible to FedEx's external customers. The success FedEx has in managing the extensive truck and airline fleet exemplifies the benefits achieved when knowledgization is tightly coupled with a logistics system.

Inclusion is also clearly incorporated in the FedEx business strategy. Customers can do some of the work of tracking and managing the packages sent. Customers needing assistance can contact the FedEx service agent, who has access to all the information available related to a customer's shipment.

Zero resistance is also made manifest by the FedEx tracking system. As a package moves through the system, the updated information is available immediately to customers and service agents who query the system. There are no waits, delays, or blocks to this information.

FedEx, however, does not completely exemplify the Zero Time organization, in that the hub-and-spoke architecture used to process packages is, by definition, not a holonic concept. A holonic view would say that every location has been empowered to send a package to whatever location is necessary to insure on-time delivery. Using a hub-and-spoke architecture means every package must go through the hub in order to reach a new spoke. This has been a highly successful and original concept for package delivery. While we do not advocate changing the architecture to a point-to-point design, we do wish to note that this limitation exists–and at some cost to FedEx.

Had FedEx been an actual Zero Time organization, its experiment with Zap Mail, a service that used fax machines to send documents immediately to their destination, might have evolved differently. In fact, we suggest that FedEx could have "owned" the fax industry. A Zero Time organization would have given all customers a fax machine as part of their service, in the way FedEx gave its largest customers computers equipped to track packages and print airbills. Customers would have looked to FedEx for their fax services. We believe had FedEx been a truly Zero Time organization, it would have conceived of the idea of Zap Mail much earlier and would have been the supplier of fax machines to virtually every business.

We find these examples have several design characteristics in common. First, having an explicit "time-driven" culture from the beginning can be a big benefit to an organization. Michael Dell expresses this culture as " the biggest change from business as usual is changing the focus from how much inventory there is to how fast it's moving"(Magreta, 98). *Inventory velocity* is thus a

key performance measure that Dell watches closely. As a consequence, Dell built an extensive information infrastructure to manage velocity, which it sees as managing information. FedEx uses time as a key factor to define its business. "By 10:30 a.m. next day" became an industry standard that its competitors had no choice but to follow. Fred Smith expressed his vision as "the consequence of failure to deliver within a specified period of time would far outweigh any consideration of reasonable rate comparisons" (Davis, 1994). This thinking became the foundation of the FedEx engine. Time is considered of paramount importance, with a goal to drive it to zero. Intel is another company that possessed the time-driven culture from the beginning. Its cofounder, Gordon Moore, stated that he expected the performance of the integrated circuit to double every 18 months. This became the famous Moore's law that set the standard for the industry. By designing a Zero Time organization from a green field, opportunities emerge that are unimaginable at the conception of an organization. As environments change, Zero Time organizations will be better equipped to sense, respond to, and capitalize on those changes.

Second, all of these companies empowered their customers by shifting work to their customers through automation. In the case of Dell, the customer is responsible for placing an order, through the company's web site, which starts the manufacturing process. And in the case of FedEx, customers can track packages themselves, eliminating the need for interaction with customer service agents for routine queries.

Third, all these companies are virtually integrated with their partners (suppliers, distributors, service providers, etc.) in such a fashion that these partners are treated as if they are inside the company. Dell expresses his view of integration as, "When we launch a new product, our suppliers' engineers are right in our plants. If a customer has a problem, we can fix it in real time" (Magreta, 1998). Intel has been practicing this for years, as customers and suppliers participate jointly in the design of new products. FedEx, on the other hand, owns its own logistic operation and hence is tightly integrated with its information tracking system. In this way, it can partner with its customers to provide logistics services that go beyond simply moving packages. Zero Time organizations exploit the value of information sharing in order to maximize the time value of information.

Becoming a Zero Time Organization

> *"If you can dream it, you can do it.*
> *Always remember that this whole thing was started by a mouse."*
> Walt Disney

> *"To my imagination it is far more satisfactory to look at (well-adapted species) not as specially endowed or created instincts, but as small consequences of one general law leading to advancement of all organic beings—namely, multiply, vary. Let the strongest live and the weakest die."*
> Charles Darwin

We have described the concept of Zero Time and the disciplines needed for a Zero Time organization. We have also illustrated these concepts with examples of near Zero Time organizations from well-known businesses. In this section, we apply a methodology (Yeh, 1994)

for any organization to follow to evolve holistically into a Zero Time organization. The methodology consists of two concurrent phases: *strategic visioning* and *operational excellence.* These two phases are like the two sides of a coin and must go hand in hand for the methodology to be effective. Strategic visioning is concerned with doing the right thing (core value, vision and strategy) whereas operational excellence is concerned with doing things right (making operations work). Organizations then move towards their vision, using the methodology, within the context of its core value. Jack Welch of GE successfully implemented this approach via the management concept of "planful opportunism" by setting a few clear, overarching goals and then empowering his people to seize any opportunities to implement these goals. A Zero Time organization is able to rapidly cycle through these two phases, while learning and adapting. Below we elaborate on these two phases.

Strategic Visioning

Strategic visioning consists of three parts: establish a deep-rooted core-value system for the organization, define a strategic Zero Time vision, and establish strategy for evolution.

Establish a deep-rooted core value system

Core values implicitly and explicitly describe the purpose of any business. They highlight why the organization exists. Core values are the common bond among people in any organization that guide the behavior of each person. A well-aligned organization is one where its core values are deeply rooted. A deep-rooted core value system helps to render an organization more transparent and consequently more zero resistant. For example, under the guidance of its credo, Johnson & Johnson immediately removed all Tylenol capsules from the entire US market when the deaths of seven people in Chicago area led to the discovery that someone had tampered with Tylenol bottles and cyanide. On the other hand, without a deep-rooted core value system, Exxon dragged its feet for nearly a month before responding to its oil-transport spill off of the Alaskan coast

Define a strategic Zero Time vision

Zero Time vision selects *time* as the most important independent variable in the organization, and use Zero Time concepts to drive everything to meet and exceed internal and external customer expectations. The term "vision" means clearly understanding what value the business brings to their stakeholders. In the digital economy (Tapscott, 1995), the compression of time will lead to many other attributes of value for stakeholders. Time compression reduces costs and inventories, while leading to increased quality. For example, when NEC's Samitomo factory was redesigning the manufacturing line, goals of reducing the time to zero were set. Likewise, Intel mandates the doubling of performance of its processor products every 18 months; SONY and Medtronic use the concept of multigenerational product families to continually compress time-to-market; Dell follows their vision of build-to-order.

Establish strategy for evolution

Unlike evolution in nature, which appears to be random and unintentional, strategic evolution of the human organization is intentional and purposeful. Natural evolution is gradual with very small increments of change, whereas strategic evolution builds on an accumulating critical mass of knowledge with an eye towards the end goal. For example, natural selection took a few million

years to develop the first flying mammal, the bat. By contrast, man flew to the moon and back only 75 years after the first manned flight by the Wright brothers. In fact, it took a mere 30 years after the Wright brothers' proof that flight was possible for Douglas Aircraft to introduce the DC-3 jet engine, in 1935. This was followed by President Kennedy's compelling vision to "put a man on the moon and bring him home within this decade," which drove the nation to invest heavily in NASA to achieve the goal. Strategic evolution provides dramatic potential for time compression compared to natural evolution.

The business world is full of examples of rapid evolution based on brilliant strategies. For example, GM attacked Ford in the Model T era with a flanking strategy of segmentation, embodied in the famous quote, "a car for each income strata." But later, GM was flanked by the VW, which used the "small is beautiful" slogan. Wal-Mart attacked Sears with a guerilla strategy by building their stores in small towns first. The "cola wars" between Coca Cola and Pepsi are well known examples of defense and frontal attack strategies. How does an organization position itself to achieve their vision, while keeping an eye on general trends and their specific competition? The organization must develop an integrated strategy for evolution that consists of 1.) a focus on specific goals, 2.) a critical mass of knowledge including competitive intelligence and market trends 3.) an understanding of critical technologies needed to achieve these goals, 4.) a tactical plan of how to move ahead, and 5.) a coordinated investment of resources.

Figure 8: Summary of Strategic Visioning Phases

Phase	Description
Establish a Deep Rooted Core Value System	Values are the common bond among people in the organization
Define a Strategic Zero Time Vision	The vision is a customer-focus, value-added goal which drives process time to zero
Establish Strategy for Evolution	Strategic evolution is the purposeful and intentional change and adaptation made to achieve the vision. Strategies include flanking, guerilla, and frontal attack.

Operational Excellence

Operational Excellence also consists of three concurrent phases: build a knowledgization infrastructure, establish a Zero Time culture, and make all processes zero resistant.

Build a knowledgization infrastructure

An organization's infrastructure consists of three primary entities: people, technology, and organizational structure. The following four subdisciplines will address the relationships between these entities: informationalization, molecularization, learning, and a time-based management system.

Informationalization

This is the seamless integration of computing, communication, and content technologies. The integration of computing and communication, as envisioned by Konge Kobayashi of NEC more than twenty years ago, is conventional wisdom today. In order to empower each individual within the organization, information/knowledge must be at each individual's fingertips whenever, wherever he or she needs it. Furthermore, it must be available in a user-friendly fashion, in the form that the user would want to see and use the information. By content technology, we mean not only the knowledge nugget the user gets, but also the medium by which that information is delivered and the ease of accessing the information.

Informationalization will help an organization be closer to its customers by making the information directly accessible to customers. For example, by making its tracking system available to its customers, FedEx's customers can instantly find out where their packages are. At the same time, the system relieves FedEx personnel from handling many routine customer calls. Through informationalization, an organization can trade off physical space with virtual space and provide transparency. The benefit is the opportunity to provide customized services and rapid response to customers' needs.

Other benefits of the informationalization include shrinking overhead, inventory, and working capital. For example, Dell's build-to-order manufacturing guarantees five-day delivery, and requires only three days of factory inventory. Furthermore, its down-line capital commitment is nearly zero versus tens of thousands of dollars of inventory required by those who use dealer channels. Another example is the fight for dominance in the film industry between HP and Kodak. The HP vision is to use digital camera to capture the image, edit it with the home PC, and e-mail the image to grandma, for example, who then prints out the picture in her home HP printer. Such a scenario would eliminate film and processing, which comprise much of Kodak's revenue. Should HP be successful, the use of informationalization would radically change the photography industry. Similarly, General Motors' OnBoard system provides content to passengers while they are travelling in a GM car. However, we believe that this system used to deliver the content to the GM cars will also provide an infrastructure for expanded business opportunities which will transform the automotive business. In the case of eyeglasses, Lenscrafter is already practicing manufacturing at point of delivery as compared to the old mode in which eyeglass lenses are ground, molded, stored in a central location, then distributed to retail outlets weeks later. Point-of-delivery manufacturing has radically changed the eyeglass industry.

Informationalization provides interorganizational connections, such as the database linkages between retailers/manufacturers and their suppliers. It also is the basis for global connections. For example, information content is often stripped from the original product and transported globally through a sophisticated information system. A key example is found in the newspaper/magazine publishing industry, where information is passed to different locations digitally, and local suppliers then customize the publication for the local market.

Molecularization

An organization must be reshaped with molecules, or clusters of individuals coupled with technology and process components, as the basis of organization activities. In other words, a Zero Time organization must be component based in terms of people, technology, process, and organizational structure so that it can dynamically organize these components into teams that

deliver necessary value to the customers. Diamond Technology Partners, a relatively new consulting firm headquartered in Chicago, provides a good example of this concept. Diamond Technology Partners has built an organization model that allows it to instantly assemble a team of consultants from a diverse, geographically spread out set of employees. It has instant customerization in that new business is instantly serviced by the best available set of individuals. The team is empowered to do what needs to be done to satisfy the client engagement. The team is backed up by a powerful knowledge management system that takes the client engagement notes and stores them as knowledge not only for the current team, but for any other teams that may be faced with similar problems in future engagements.

Learning

Learning implies that the organization will provide an infrastructure for continued gathering and digesting of information. The digital economy is a knowledge-based economy, which means more and more people working in any organizations will be knowledge workers. It is estimated that at the current rate, knowledge is growing at a rate of doubling every seven years. Science and engineer college graduates will become obsolete four years after graduation. At the same time, it is no longer feasible for corporations to send their people back to the universities for a substantial length of time to update their knowledge. We believe that in order to survive in the 21st century, every enterprise must be a "learning organization" (Senge,1990). A good example of this learning infrastructure is the previously mentioned 15-percent rule of 3M, which facilitates experimentation and learning.

Build time-based management system

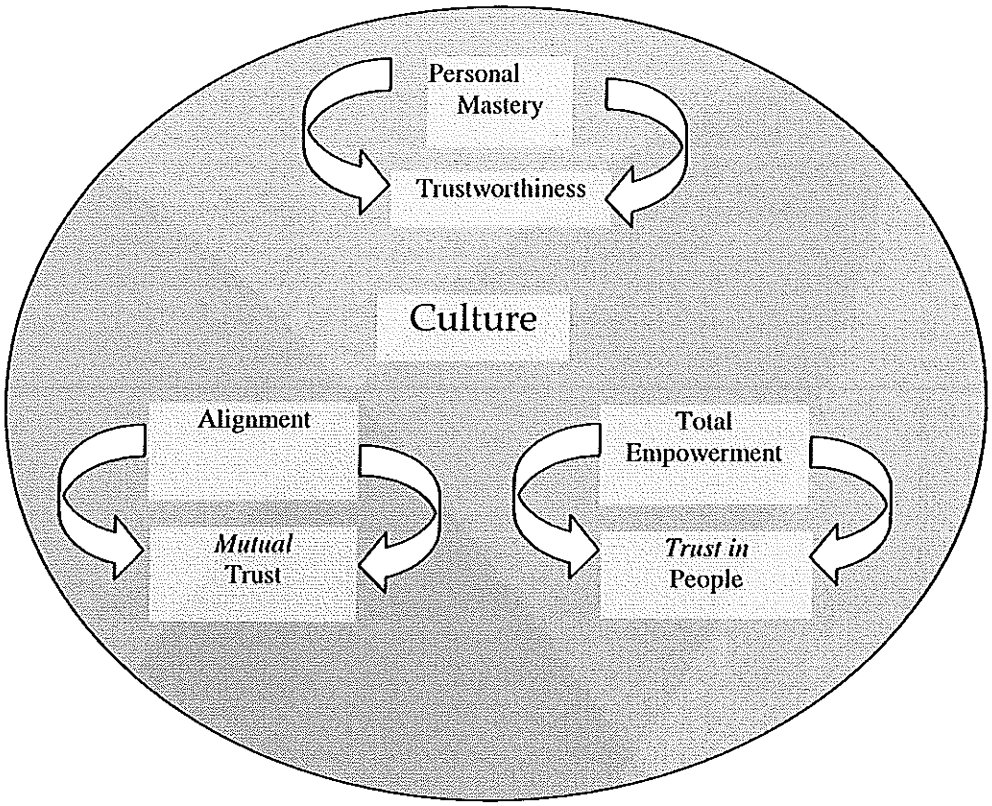
Such a system is needed to monitor, reward, and improve Zero Time practices. Some examples of measures include:

- Product development–time from idea to concept; rate of new product introduction; percent of first competitor to market.
- Decision making–decision cycle time; time lost waiting for decision.
- Customer service–response time; quoted lead time.
- Percent delivery on time.
- Time from customer's recognition of need to delivery.
- Processing and production – value added as percent of total elapsed time; inventory velocity; first-pass yield.

Establish a Zero Time culture

Culture defines major parts of the relationships among entities in an organization. A Zero Time culture is one that facilitates the realization of instant customerization of the organization. We believe that the following three subdisciplines are needed to build a Zero Time culture: personal mastery, total empowerment, and alignment. Further, each of these subdisciplines leads to a different type of trust (See Figure 9).

Figure 9: Zero Time Culture Disciplines



Personal mastery

This discipline helps each person to have the ability to master his or her work. Such ability helps to establish self-worthiness and consequently enhances the organization's ability to be zero resistant. A Zero Time organization must foster a climate in which personal mastery is practiced in daily life as is done by master artists. This means that the culture must be safe for people to create personal vision and challenge the status quo. For example, when Jack Welch took over as CEO of GE, he pushed to consolidate the infrastructure with cost cutting efforts. However, he also recognized that focusing on the bottom line alone had limitations. Therefore in an effort to foster a culture which encouraged personal mastery, Welch made a commitment to his workers of "life time employability" to replace the traditional "life time employment" and the result was an increase in average productivity from below 2% to above 5%, which for an employment force of 300,000 people is a very significant increase.

Total empowerment

This is the consequence of zero resistance, and holonic management. The relationship between any individual or team and its coordinating person must be such that the individual or team can act alone with full power. Otherwise, an organization cannot achieve Zero Time . In fact, when each link within the organization is empowered, the organization has indeed achieved customer empowerment. In effect, the entire value chain becomes Zero Time . Sports are a good analogy of

this discipline in that each player in a team during competition is totally empowered. The coach is powerless during the actual act when a quarterback passes to a wild receiver, demonstrating total empowerment of the quarterback. In different enterprises, these players represent front-line personnel, front desk clerk in hotels, sales representatives, or customer service personnel on call to customer sites. For example, at the hotel chain the Ritz Carlton, employees are trained to understand the goals and values of the organization, and to remind them, each employee carries a small card with these important ideas. When a customer asks any employee for something, that employee is empowered to do what is needed to satisfy the request. Likewise, at Disneyland, when a guest is unsatisfied or in need of something, any Disneyland employee is empowered to do what is needed to improve the customers visit.

Alignment

The ability to align, or instantly form teams that consist of members from geographically dispersed locations in order to meet customers' needs, must be part of the core competency of any organization that thinks in Zero Time . Underlying a culture of alignment is trust. Members within an enterprise, and among closely linked enterprises (the inclusion discipline), must trust one another for the new team to have high performance. Diamond Technology Partners is an example of an organization that is based on mutual trust, and consequently, is able to effectively align when the need arises to configure a new team of geographically dispersed individuals for a work project.

Mutual trust in this case means that all managers, employees, and closely linked partners understand the direction in which they are headed and can expect everyone else to have the same understanding. Further, each individual can expect all other individuals to make every effort to move in the right direction. Finally, each individual can expect that the organization will not suddenly change it's goals.

In order for an organization to be zero resistant, each individual or team/business unit in the organization must have its goals align with the organization's goals. In this case, the shared vision of the organization becomes an extension of each individual's vision. Such an aligned organization is one that enjoys both the molecularization and interconnectedness. Jazz musicians understand alignment when they play without scripts and can follow the flow.

A Zero Time culture is one in which each individual and team is a "whole," and therefore is empowered and able to make decisions that may result in honest mistakes. These mistakes are tolerated as part of the learning experience. For example, in most of the automobile manufacturing plants today, any assembly line worker can stop the entire line if process errors are discovered. This demonstrates a situation where employees are empowered and have the ability to make major decisions. In this type of organization, the goal of every organizational subunit is in alignment with that of the organization. Thus, by satisfying the goal of the organization, each employee also meets his or her own personal goal.

Make all processes zero resistant

A process represents how work is structured and performed within an organization. The processes of a Zero Time organization must be zero resistant. This means that all resources are available

when needed, and that people, technology, and knowledge modules are seamlessly integrated to support process execution. Finally, knowledge is automatically created as processes proceed along. The kiosks at Disney World from which tourists can make reservations, and order food and drinks to pick up at the restaurant are an early example of zero-resistant process. Of course, ATMs provide banking services to customers at locations convenient to the customers, airlines such as Continental sell tickets through remote kiosks, Dell Computers sell systems virtually anywhere using the Internet, and tourists can get information on almost any destination in the world using the World Wide Web. Virtual kiosks are becoming commonplace.

An important note is the distinction between two types of processes: physical and virtual. A classic physical process is the manufacturing assembly line, where parts flow through the process and are assembled into systems. On the other hand, virtual processes are information based, and often supplement physical processes. The physical processes turn raw materials into products, whereas virtual processes turn raw information into new services. Clearly these new information products can be delivered through information- based media such as the Internet, satellite, and telephony, adding value by delivering information and knowledge to destinations convenient to customers. An additional difference between physical and virtual processes is in the construction of the process steps. Physical processes are typically linear, with a sequence of steps to be followed. Virtual processes are typically non-linear, consisting of a matrix of potential inputs, transformations, and outputs depending on the needs of the customer of the process.

Thus, Zero Time organizations are the ones who have traded physical processes for virtual processes. Zero resistant processes typically have a large component of information, and are likely candidates for automation and time compression. Of course, the more virtual processes included in the value chain of an organization, the higher the effect of Zero Time, due to the multiplication factor in calculating value. Zero resistant virtual processes provide numerous benefits for organizations. First, virtual processes are used to redefine economies of scale. There is little, if any, distinction between a virtual process of a big and small company. For example, it is impossible to tell the size of a company simply by their processes offered over the Internet. The Post Office provides us with another example. FedEx was able to effectively create a virtual post office in every individual customer's business, which was inconceivable to the Post Office, which operates in physical space alone. Second, virtual processes redefine economies of scope. Organizations with virtual processes have an easier time reusing the digital assets for different situations. It is much simpler to replicate a virtual process than a physical process. This leads to the third benefit: decreased transaction costs. The cost of a virtual process is typically orders of magnitude less than a physical process. For example, the cost of processing a withdrawal from a teller at a bank is much more expensive than the cost of processing a withdrawal from an ATM.

In summary, an organization with zero resistant virtual processes will be able to get much closer to customers. The organization will be able to project their business into the space of the customers over communications media. The processes can provide instant feedback to the organizations, giving them an advantage of understanding customer needs before organizations operating physical processes. And therefore opportunities are more easily identified which create value for customers. It is our opinion that any enterprise can become a Zero Time organization using the methodology outlined above. Figure 10, below, summarizes the phases of operational excellence of a Zero Time organization.

Figure 10: Concurrent phases of Operational Excellence

Phase	Description
Build a knowledgization infrastructure	Relationships between people, technology and organization. Based on informationalization, molecularization, learning and time-based management.
Establish a Zero Time culture	Disciplines of Personal mastery, total empowerment, and alignment that lead to trustworthiness, trust in people and mutual trust.
Make all processes zero resistant	All resources are available when needed, and people, technology and knowledge are seamlessly integrated to support process execution.

To summarize our concept of Zero Time, we borrow from the earlier quote by Darwin, and reframe it using the terms and concepts described in this paper.

> Zero Time enterprises are those well-adapted organizations primarily as a consequence of strategic evolution, namely within the context of its core value system, they use time as the paramount driver to experiment, select, and act through rapid learning cycles in order to achieve its vision of instant customerization.

Being a Zero Time Organization

> *"To boldly go where no one has gone before..."*
> Star Trek

In their book *Discipline of Market Leaders*, Treacy and Wiersema discuss the cultures of the three kinds of market leaders: operational excellence, customer intimacy, and product leadership. They conclude that the operating model for each market leader is sufficiently different to the degree that people who are comfortable in one usually do not fit effectively with a different operating model. However, Geoffrey Moore, in his best seller *Inside the Tornado*, considers that these three models fit well into the life cycle of a high-tech organization. He believes that it is imperative for an organization to change its operating model before it can pass to the next state of growth. We believe that the phenomenon observed by Moore is not restricted to high tech companies only. In our opinion, a Zero Time organization diffuses the cultural boundaries among these three different

models, and transcends their differences by focussing on the unifying principle of time. By considering time as the most important independent variable, we believe there is a unifying culture that will automatically lead to the evolution of the operating model in its life cycle.

One of the key characteristics of a Zero Time organization is that the entire organization can reside in each of its employees, each of its products, and each of its services. In other words, essential knowledge of the entire organization can be embedded into each of its components–which is also "whole."

The most important differentiation of a Zero Time organization from others is that of a shift from mechanical to a holistic mindset. ***A Zero Time organization has the ability to see differently and has the ability to act instantly.*** It is this combination of abilities that, in our opinion, provides the capability to instantly convert knowledge into customer value. And this will be the key competitive edge for businesses in the 21st century.

In sum, the organization model for the 21st century is the Zero Time organization. This organization is one that embodies the five disciplines of Zero Time , and effectively provides instant customerization. It is our belief that Zero Time organizations will own their customers as customers come to realize the value provided by the Zero Time organization–resolved problems, reduced costs, etc. Speed and variety, tools for non-Zero Time organizations, are actually embedded into the processes and activities of the Zero Time organization. Managers who begin to build a Zero Time organization will be the leaders in the next wave of business change. These managers will be the ones who understand the importance of a value-driven organization. They will be imbued with a series of beliefs and values that support Zero Time as it is conceived for their specific industries. These managers will be the ones who are not afraid to empower their employees, teams, and subunits. They will be the ones who cultivate a culture where power is gained from not only knowledge, but the sharing of knowledge. And these managers will be the ones who understand that the only certain fact about their industrial environment is that it will change. Zero Time organizations are the ones that can quickly and effectively adapt to rapid, continuous change.

> *"I have tried to paint the picture of what such an organization would be like and how it might be built – so that people can see the choice that exists. The choice, as is always the case, is yours."*
>
> Peter Senge, The Fifth Discipline

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